

Non-Mendelian Genetics Practice Problems – Show punnett squares for ALL of them!

INCOMPLETE DOMINANCE/CODOMINANCE

1. In radishes, the gene that controls color exhibits incomplete dominance. Pure-breeding red radishes crossed with pure-breeding white radishes make purple radishes. What are the genotypic and phenotypic ratios when you cross a purple radish with a white radish?
2. Crossing a black cat with a tan cat produces a tabby cat (combination of black and tan).
 - a. Cross a tan cat with a tabby cat, what are the phenotypes of the offspring?
 - b. If you wanted all tabby cats, what color cats would you want to breed?
3. Predict the phenotypic ratios of offspring when a homozygous white cow is crossed with a roan bull.

BLOOD TYPING PROBLEMS

1. If a man with blood type AB marries a woman heterozygous for type A, what is the probability that their child will be type B?
2. A mother has type A blood and a father has type B blood. If their baby has type O blood, what is the genotype of the parents?
3. Use a punnett square to show the possible genotypes and phenotypes for blood type of the offspring of two parents, one with blood type O and one with blood type AB.
4. Two women gave birth to girls in the same hospital at the same time. The nurses think they may have accidentally switched the babies' name tags and given the babies to the wrong parents. One baby, Jane, is type O. The other baby, Mary, is blood type A. The father in one set of parents, the Reds, is blood type A, and the mother is type B. The father in the other set of parents, the Greens, is blood type AB, and the mother is type O. Figure out which baby belongs to which parents. Show your work and reasoning.

SEX-LINKED PROBLEMS:

1. In fruit flies (*Drosophila*), one eye color gene is x-linked, with a recessive white allele and a dominant red allele. If white-eyed female flies were bred to red-eyed male flies, what would be the expected offspring (assume all parental flies are purebred)?
2. Earl has normal color vision, while his wife Erma is colorblind. Colorblindness is an X-linked trait, and the normal allele is dominant over the colorblindness allele. If they have a large family, in what ways should the colorblindness affect their children?
3. Ethan is colorblind. His wife, Edna, is homozygous for the normal color vision allele. If they have eight children, what percentage of them would you expect to be colorblind. Show a punnett square and list genotypic and phenotypic ratios.